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(56) Documents cited
GB 0700854 A GB 0637683 A GB 0513497 A
GB 0511033 A

(58) Field of search
UK CL (Edition K) F2H HFC
INT CL[5] F16B 23/00
On-line databases: WPI

(54) Security fastener and tools to operate same

(57) The drive formation of a smooth security fastener is a single smooth hole co-axial with the fastener. The smooth hole is reduced in diameter in step(s) along its length, and can be drivingly engaged by a tapered tool provided with spiral grooves along its length. The smooth hole may be chamfered or curved at the head surface and at each step. The smooth hole may extend into the shank of the fastener, and be tapered or curved. The fastener may be externally or internally threaded with a left or right hand thread (or may be of bayonet form); the fastener may be headless. The tool may have a tapered drive formation at each end with spiral grooves of opposite hand. A pilot may be formed on the leading end of the tool.

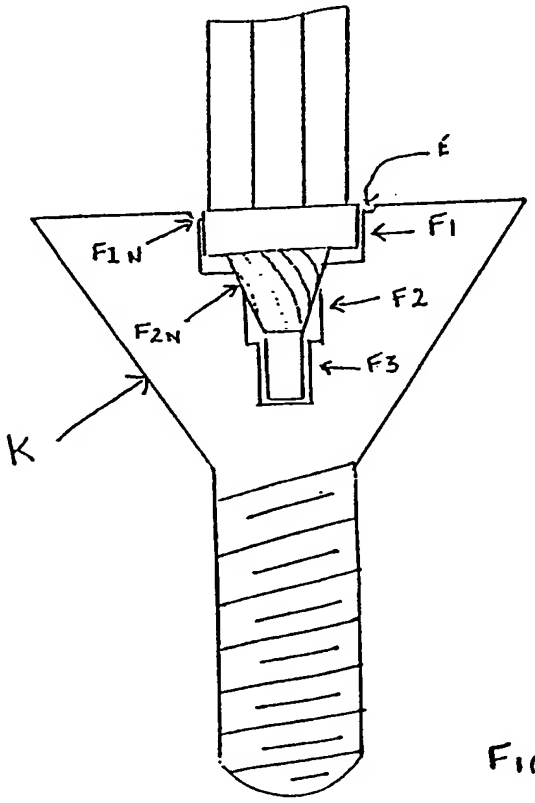

FIG 11

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

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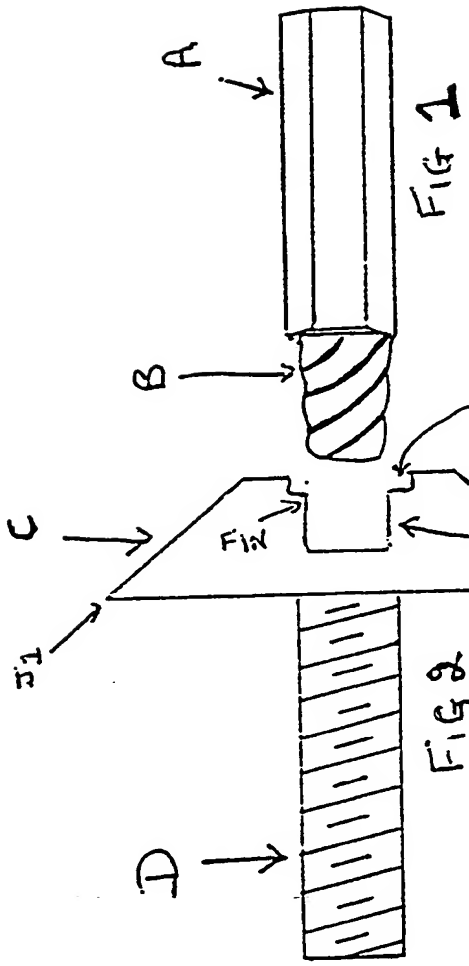

FIG 1

FIG 2

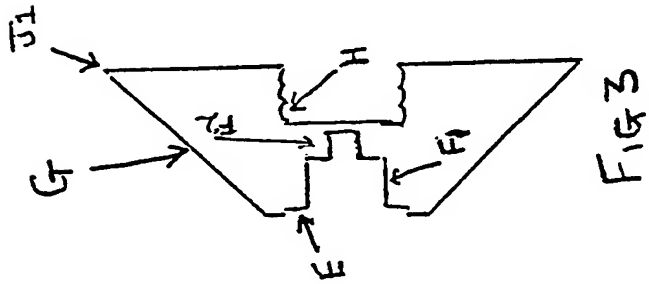

FIG 3

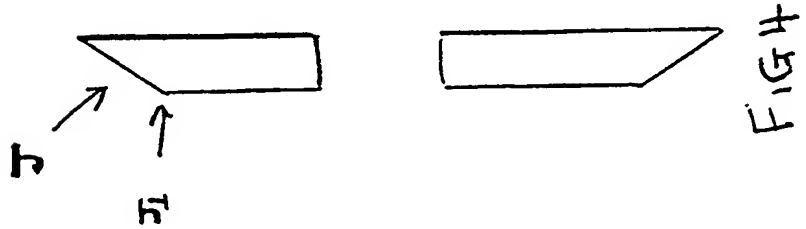

FIG 4

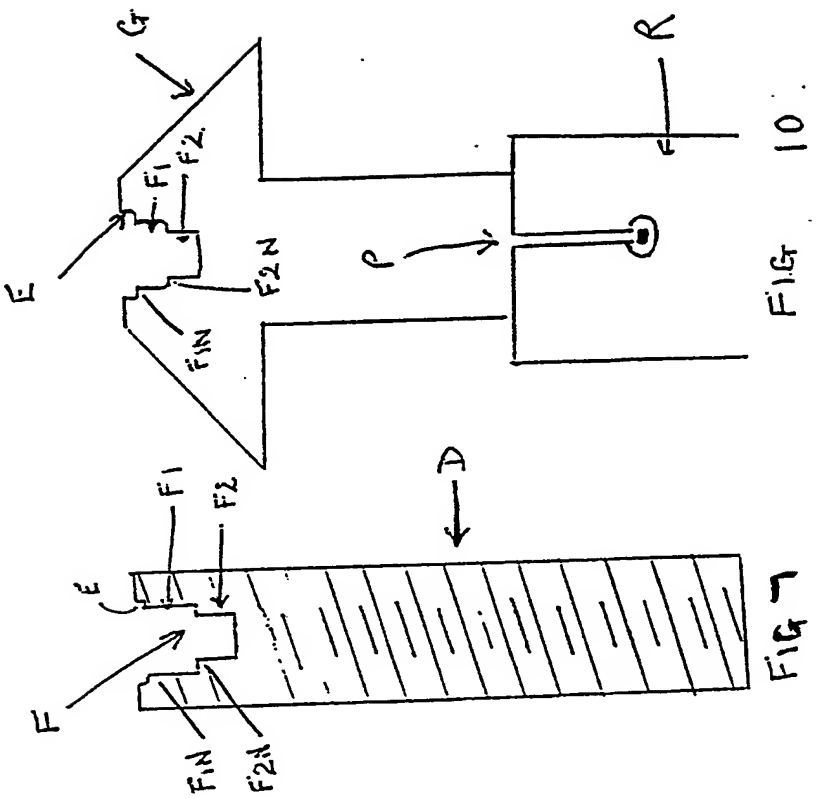

FIG 10

FIG 7

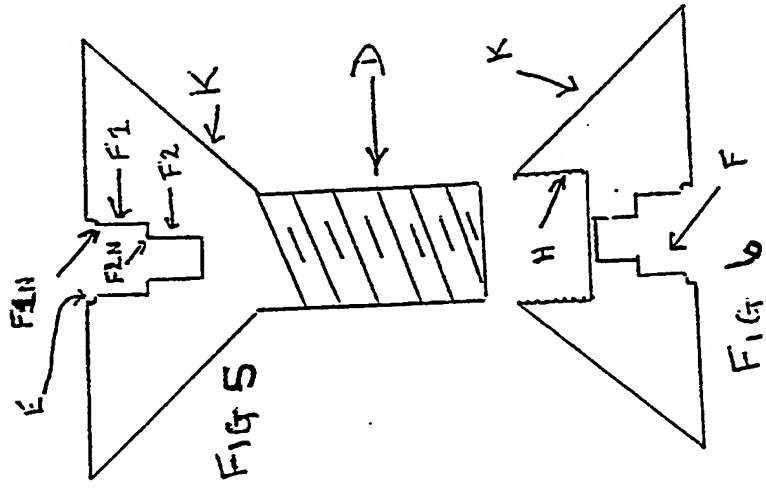

FIG 5

FIG 6

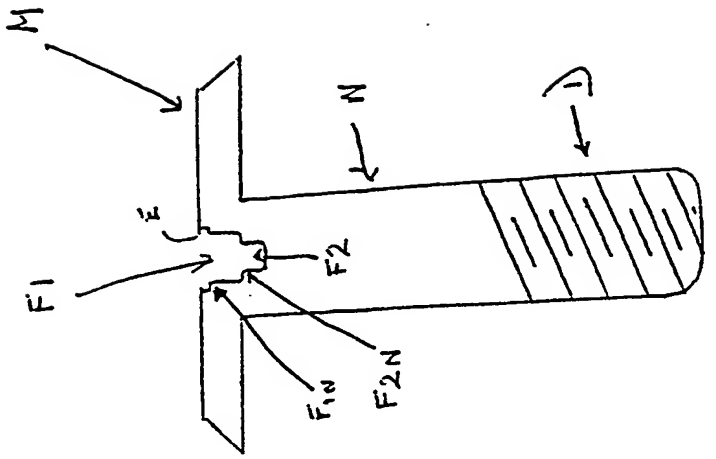

FIG 9

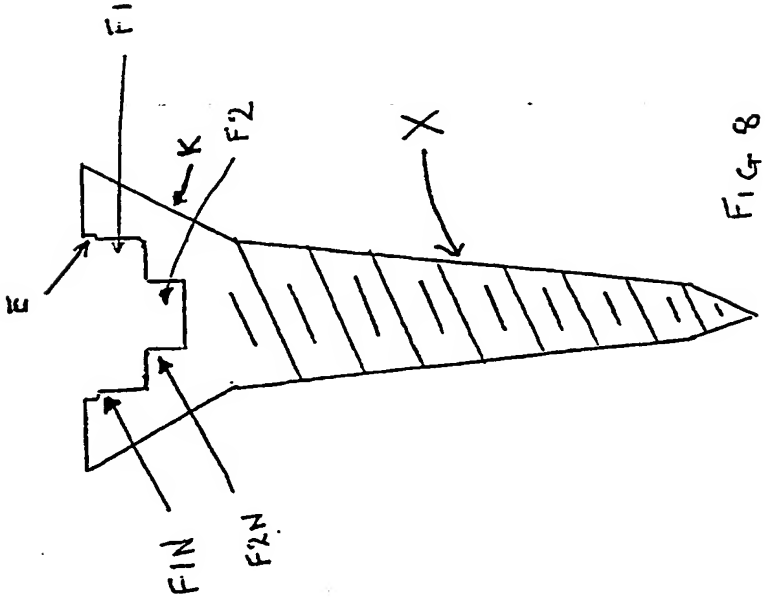

FIG 8

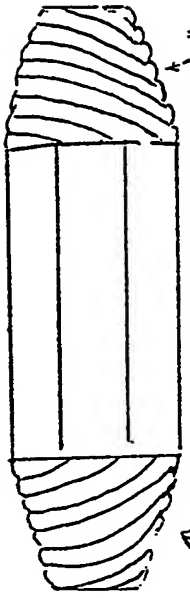

FIG 12

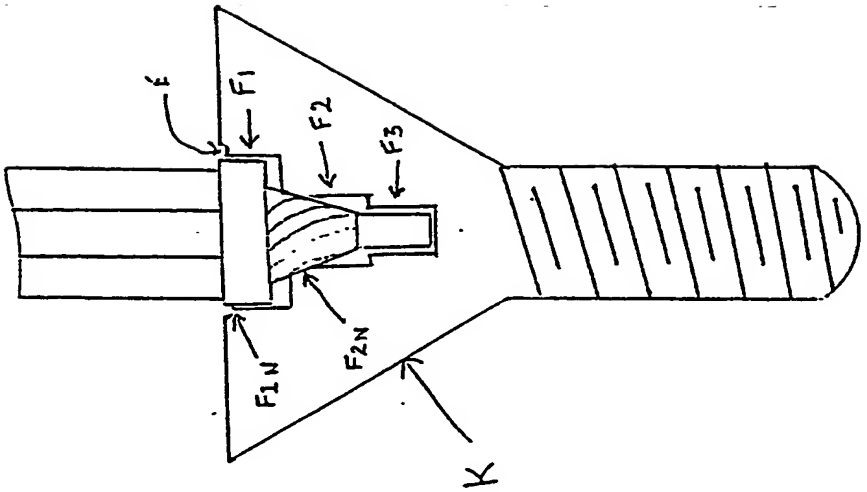

FIG 11

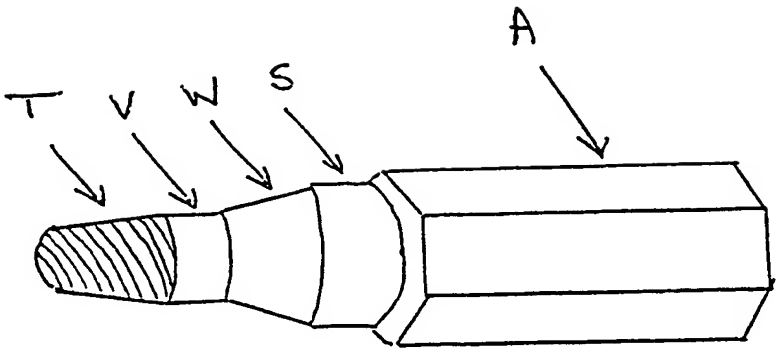

FIG 15

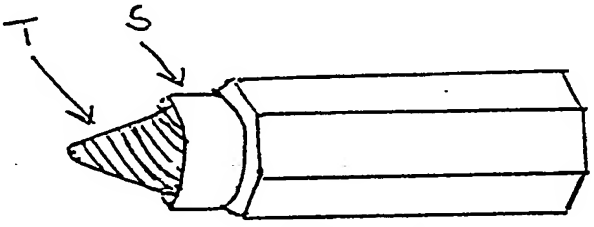

FIG 13

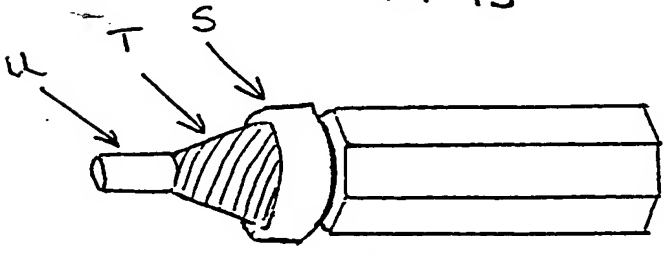

FIG 14

E = SMALL RECESS

F1N = LARGEST DIAMETERS NECK.

F1 = DRIVING OR TIGHTENING DIAMETER.

F2N = SECOUND DIAMETERS NECK.

F2 UNTIGHTENING TOOLS DIAMETER

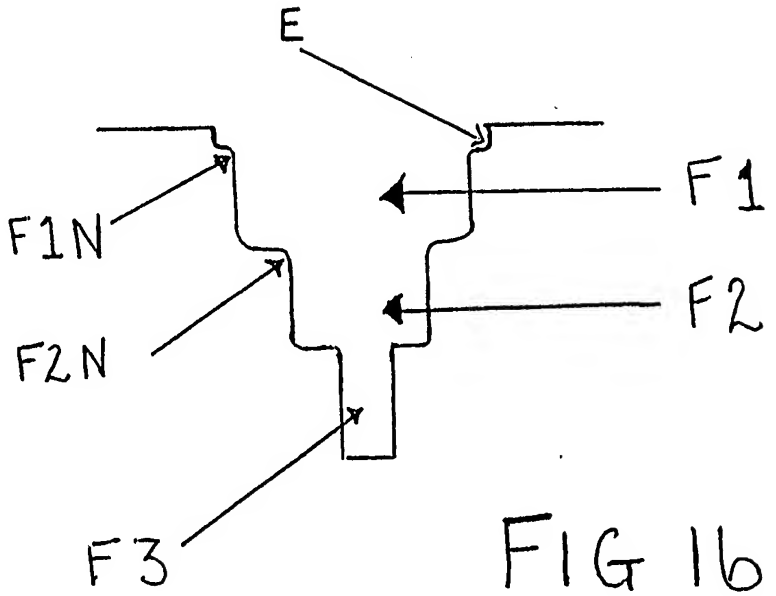

FIG 16

F3 PILOT HOLE

9/6

SECURITY FASTENER AND TOOLS FOR OPERATING SAME

This invention relates to security fasteners and, more particularly, to security fasteners which rely on tightening by the transmission of torque by means of a special tool, inserted in on or against specially designed recesses, protrusions or shaped areas situated at either end of the security fastener.

Fasteners which resist removal by conventional means, such as screwdrivers, hex keys, spanners and the like, are generally known in the art. Typically, such security fasteners fall into one of three general types:a) Fasteners with breakaway heads or protrusions:b) Fasteners with one way heads or one way method of turning on headless fasteners: and c) Fasteners with a specialty shaped heads or in the case of headless fasteners such as nuts, specialty shaped areas. The first two types a) and b) by their design can only be tightened and are considered permanent once installed. The third type c) are characterised by unusually shaped recesses or protrusions situated at the head or end of the security fastener which allows transmission of torque to be applied in either direction by a tool which is inserted in or on the special shaped area on the security fastener. This is the only one of the aforementioned types which is capable of being removed by reverse transmission of torque thereby making it capable of reuse.
These type c) security fasteners , to which the present invention relates, are generally known in the trade. Examples of such fasteners can be found in US patent Nos 3,369,441 & 4,258,596. These known security fasteners however, are not without their disadvantages. One problem common to them is the shape of the recesses,protrusions or shaped areas be they slotted , socket shape with hex or multi-hex,tri lobed, holes with threads in, holes with off set holes at their bases, or more complicated special shapes with ring shaped recesses with multi drilled holes, is that they all have on the recesses or protrusions, areas against which, tools not specifically designed for the removal of the security fastener can in practise be brought into contact against to achieve transmission of torque by leverage or grip.
Another problem is that the same tool is used for both tightening and removal of the security fastener thereby making it impossible
to restrict the removal tool to selected persons.
Yet another problem is that the shape of the

recesses or protrusions on known security fasteners have become more intricate and complex, which in turn results in time-consuming and expensive manufacture of both the security fastener and its tools.

I have invented a security fastener against which it is exceptionally difficult to apply the transmission of torque except by the use of specially designed tools. Furthermore, the security fastener is so designed as to require separate tools to tighten and untighten the security fastener.

The security fastener has only one single smooth bore hole situated in it. This hole may however be of reducing diameters through its depth, all diameters having their centres situated along the longitudinal axis of the security fastener.
The security fastener therefore has no flat or curved areas or protrusions against which to apply leverage to achieve the transmission or torque as commonly found on other special shaped security fasteners.
The transmission of torque can only be applied by a specially designed tool such as that incorporated in this invention, which has the capability of locking into a smooth bored hole thereby achieving transmission of torque.
Also this special shaped security fastener does not have to be manufactured to close tolerance or require expensive tooling.It is therefore cheaper and easier to manufacture than known security fasteners.
Briefly, my invention comprises a security fastener which has a single smooth bored hole, be it of different diameters throughout its depth. The invention also extends to the combination of the security fastener or fasteners together with the tool or tools used to tighten and untighten them. The tool or tools, having situated at some part along their length a tapered area, the tapered area having on its surface spiral grooves. The spiral grooves when inserted into the smooth bored hole of the security fastener and rotated inwards, lock against a neck area within the hole, resulting in the transmission of torque.
The degree of taper on the tool or tools may vary, as may the length of the tapered area and the number of spiral grooves on the taper. Also, the angle of the spiral grooves on the taper may vary. These variations are due to the different hardnesses of material used to manufacture security fasteners. Security fasteners can be made of, for instance, Stainless Steel, High Tensile

Steel, Mild Steel, Brass, Nylon or Plastic.
A tool used to tighten a security fastener which has a right-hand thread would have right-hand spiral grooves on its taper. A tool used to remove or untighten a right-hand threaded security fastener would have left hand spiral grooves on its taper.
A tool to tighten a left-hand threaded security fastener would have left-hand spiral grooves on its taper, and a tool used to remove or untighten a left-hand threaded security fastener would have left-hand spiral grooves on its taper.
An essential requirement of the taper on the tool, is that the smallest diameter of the taper must be smaller than the selected hole diameter of the security fastener into which it must lock, also the largest diameter of the taper on the tool must be larger than that of the selected hole diameter, thereby ensuring that the spiral grooves on the tool's tapered area comes into contact with the neck area of the selected hole diameter in the security fastener.

Accordingly, it is an object of the invention to provide a fastener having a high degree of resistance to the application of torque by conventional tools.
It is another object of the invention to provide a security fastener having a head and a threaded shank , wherein the head has only a single smooth bored hole.
It is another object of the invention to provide a security fastener having a head and a threaded shank, wherein the head of the fastener is provided with only one smooth bored hole, be it of different diameters through its depth
It is yet another object of the invention to provide a security fastener having a head which is resistant to the application of torque which would be effective on the fastener.
It is yet another object of the invention to provide a security fastener which has no head and only a threaded shank wherein at the end of the shank is provided a single smooth bored hole .
It is yet another object of the invention to provide a security fastener which has no head and only a threaded shank wherein at the end of the shank is provided a single smooth bored hole ,be it of different diameters throughout its depth.
It is yet another object of the invention to provide a security fastener with internal thread which also incorporates in its body a single

smooth bored hole.
It is yet another object of the invention to provide a security fastener with internal thread which also incorporates in its body a single smooth bored hole, be it of different diameters throughout its depth.
It is yet another object of the invention to provide a security fastener which is economical to manufacture.
It is yet another object of the invention to provide a tool having a short tapered spiral grooved area to be received into the smooth bored hole of the fastener in engagement whereby torque can be applied to the fastener by use of the tool.
It is yet another object of the invention to provide a securiy fastener complete with a universal tightening tool ,whilst the untightening or removal tools may be manufactured to a different shape thereby offering their lawful owners added security.

Reference is now made to the accompanying drawings, the figures are of a side elevational view.

Fig 1 is a standard tightening tool
(A) having a hexagon shank
(B) having a taper on the surface upon which is a spiral groove.
Fig 2 shows a security fastener of the setscrew type
(D) having an external thread for enabling the security fastener to be screwed into an object and to be unscrewed from the object
(C) a conical shaped head which cannot be gripped, for example by a pair of pliers.
(F1) a single smooth bored hole with (E) a small recess, the hole shown is of one diameter, into which could be inserted both a tightening tool (fig 1) and a untightening tool. It is preferred however to have a hole of two or more diameters as shown in fig 5 (F1) and (F2), where the tightening tool would come into contact with the neck (F1N) of the largest diameter, which may be of a standand dimension for each diameter of fastener, whilst the untightening tool would come into contact with the neck (F2N) of the smaller diameter which could be of different dimension to suit individual untightening tools.

Fig 3 shows a security fastener of the nut type
(G) a conical body
(H) an internal thread for enabling the security fastener to be screwed onto and unscrewed off of an object
(F) a smooth bored hole of two diameters F1 & F2

with
(E) a small recess

Fig 4 a washer with (J) tapered sides (J1) being of the same diameter as (J1) on figures 2 and 3 which when placed under security fasteners figs 2 or 3 , allows the conical shape of the security fastener to be maintained.
Figures 2 and 3 may be used together as well as individually. They may also be used in conjuction with fig 4 if a washer is required.

Fig 5 shows a security fastener of the setscrew type with
(K) a countersunk shaped head.
(E) a small recess at the beginning of the hole
(F1) the larger diameter of the smooth bored hole
(F1N)the neck of the larger diameter hole against which the tightening tool would lock.
(F2) the smaller diameter of the smooth bored hole
(F2N)the neck of the smaller diameter hole against which the untightening tool would lock.
(D) the thread

Fig 6 shows a security fastener of the nut type
(K) the countersunk face
(H) the internal thread
(F) the smooth bore hole being the same as fig 5

Fig 7 shows a security fastener of the stud or grubscrew type with no head, which is tightened and untightened by way of the smooth bored hole
(F) which is as shown in fig 5
(D) the thread

Fig 8 shows a security fastener of the woodscrew or selftapping type it is shown with a countersunk head as fig 5 , but may have heads such as fig 2 or fig 9 for example
(X) is a thread which is capable of cutting into the material it has to fasten into, such as wood or metal.

Fig 9 shows a security fastener of the bolt type
(N) a plain portion of the shank
(D) the thread
(H) a flat shaped head , it may however have head shapes such as figs 2 or 5 for example.

Fig 10 shows a security fastener of the bayonet type which relies on fastening into a mated shaped object such as (R) by having a tool pressed against its surface and then turned.
(P) being the locking pins, the head shape shown

is conical but may be of shapes such as figs 5, 8 & 9.

Fig 11 shows a security screw of the machine screw type the single smooth bore hole has three different diameters
(K) a countersunk head
(E) a small recess
(F1) the largest and first diameter into which the tightening tool is inserted
(F1N)the neck of the largest diameter against which the tightening tool locks.
(F2) the second largest diameter into which the untightening tool is placed .
(F2N)the neck against which the untightening tool locks
(F3) a third and smallest diameter into which an untightning tool which has by design, a pilot at its end as shown in this figure.
In theory, the hole in the security fastener could have many different diameters and any of those diameters selected as the tightening or untightening diameter together with the combination of tightening and untightening tools to suit. It is felt however, that the preferred method will be of security fasteners with smooth bored holes containing 2 or 3 diameters after the small recess.
The security fastener can be a Bolt, Setscrew, Machine Screw, Woodscrew, Self Tapping Screw, Stud, Grubscrew, Nut or other type of fastener. It can be of any size and have threads of any form or pitch.
Security fasteners illustrated are of the threaded and bayonet type. However, the security fastener may be any type which relies on a tool being pushed and turned against its surface to achieve the transmission of torque .

The smooth bored hole in the security fastener may be of one diameter drilled or formed in its surface.It is however, preferable to have a small recess at the neck of the hole, as shown in figs 2(E), as there is the possibility of the tightening or untightening tools marking the neck area of the driven hole which may prove undesirable for cosmetic reasons.
Fig 1 illustrates a tool with a single end (B) for tightening the security fastener

Fig 12 illustrates a tool with both (F1)right and (G1)left hand spiral grooves thereby allowing the same tool to both tighten and untighten the security fastener. However, for greater security it is preferred that the tools used to remove or

untighten the security fastener be separate tools.

Fig 13 shows a tool for untightening a security fastener such as fig 5 which has two driving diameters within its smooth bored hole.
(S) is a collar which fits loosely into the first diameter of the security fastener see fig 5 (F1)
(T) is the tapered spiral grooved area which is inserted into (F2) on figure 5 and comes into contact and locks against (F2N) on figure 5.

Fig 14 shows a tool for untightening a security screw such as fig 11 which has three diameters thoughout its depth. (S) a collar which fits loosely into the first diameter(T) the tapered spiral grooved area which locks against the neck of the hole diameter see fig 11 (F2N)(U) the pilot or security pin which locates into the pilot hole shown in fig 11 (F3) By changing the size of the second diameter in the hole of the security fastener into which the untightening tool is located and also by changing the diameter ,length and shape of the third and smallest diameter into which a pilot such as shown in fig 14 (U) fits , you can manufacture security fasteners which whilst having the same common first diameter which is used for tightening, can have their own combination of untightening hole diameters ,coupled with pilots of different diameters and lengths, also the pilot could be tapered and of differing degrees. The tapered spiral grooved area on an untightening tool can be in any position from below the first collar fig 15(S), to the end of the untightening tool.
Fig 15 illustrates one of the many combinations of untighting tools which could be manufactured , to be used with security fasteners with mating holes within their heads.

Fig 15 shows such an untightening tool
(A) the hexagon end
(S) the collar to loosely fit into the tightening diameter of a security fastener
(W) a smooth tapered pilot
(V) a smooth pilot
(T) the tapered spiral grooved area.
For extra clarification Fig 16 illustrates a larger sectional drawing of a 3 diameter hole with references.
The neck areas F1N & F2N have been shown as having small round bevelled edges. These edges can however be perfect right angles or may have small chamfers according to the material used in the manufacture of the security fastener.

The tools illustrated in figs 1,12,13,14,& 15 all have hexagon shanks to insert into screwdriver type handles or sockets which accept hexagon bits. There are many such handles and sockets available in the market place both for manual as well as powered use. The tools however, may have a body of any shape and incorporate their own handles, be they of manual type or powered. Also the tools used for the removal of the security fasteners may have a locking device on or in the handle to prevent access to the tapered spiral area.

Claims to follow

Claims

1) A torque resistant security fastener having a head and shank, the shank having an external or internal thread on part or all of its length. Of either left or right hand form, for enabling the security fastener to be screwed into or on to an object and be unscrewed from the object. The head having a surface which is completely smooth with no protrusions , and of such a shape that resists the transmission of torque by grip or leaverage, in which there is a single smooth bore hole, the hole having its centre lying along the longitudinal axis of the security fastener. The depth of the hole may pass through the head thickness and into the shank. At the surface of the hole there may be a chamfer or curve of concave or convex form.

2) A security fastener according to claim one, wherein the single smooth bore hole is reduced in diameter once throughout its depth, the walls of the hole being either parallel to the longitudinal axis of the security fastener, at an angle outwards or inwards from it, or curved in a concave or convex form , and where these different diameters meet there maybe a chamfer or curved area of concave or convex form.

3) A security fastener according to claim one, wherein the single smooth bore hole is reduced in diameter twice throughout its depth, the walls of the hole being either parallel to the longitudinal axis of the security fastener,at an angle to it, curved, or any combination of parallel angled or curved in a concave or convex form,and where these different diameters meet there maybe a chamfer or curved area.

4) A security fastener according to claim one, wherein the single smooth bore hole is reduced in diameter three or more times throughout its depth. the walls of the hole being either parallel to the longitudinal axis of the security fastener ,at an angle to it, curved or any combination of parallel, angled or curved in a concave or convex form,and where these different diameters meet there may be a chamfer or curved area.

5) A torque resistant security fastener having no head only a shank, the shank having an external thread on part or all of its length, of either left or right hand form, for enabling the security fastener to be screwed into an object and be unscrewed from the object. The end of the shank

having a surface which is completely smooth with no protrusions , in which there is a single smooth bore hole, the hole having its centre lying along the longitudinal axis of the security fastener.At the surface of the hole a chamfer or concave or convex area may be formed.

6) A security fastener according to claim five, wherein the single smooth bore hole is reduced in diameter once throughout its depth. The walls of the hole being either parallel to the longitudinal axis of the security fastener, at an angle inwards or outwards from the longitudinal axis or curved in a concave or convex form,and where these different diameters meet there may be a chamfer or curved area.

7) A security fastener according to claim five, wherein the single smooth bore hole is reduced in diameter twice throughout its depth. The walls of the hole being either parallel to the longitudinal axis of the security fastener ,at an angle to it or curved in a concave or convex form or any combination of parallel, angled or curved, and where these different diameters meet there maybe a chamfer or curved area.

8) A security fastener according to claim five, wherein the single smooth bore hole is reduced in diameter three or more times throughout its depth. The walls of the hole being either parallel to the longitudinal axis of the security fastener ,at an angle to it, curved in a concave or convex form or any combination of parallel, angled or curved, and where these different diameters meet there maybe a chamfer or curved area.

9) A torque resistant security fastener having no head only a body, the body having an internal thread in part of its length, of either left or right hand form, for enabling the security fastener to be screwed onto an object and be unscrewed from the object. One end of the body having a surface which is completely smooth with no protrusions , in which there is a single smooth bore hole, the hole having its centre lying along the longitudinal axis of the body of the security fastener.At the surface of the hole a chamfer or concave or convex area may be formed.

10) A security fastener according to claim nine, wherein the single smooth bore hole is reduced in diameter once throughout its depth. The walls of the hole being either parallel to the longitudinal axis of the security fastener, at an angle or

curved in a concave or convex form.and where these different diameters meet there may be a chamfer or curved area.

11) A security fastener according to claim nine, wherein the single smooth bore hole is reduced in diameter twice throughout its depth. The walls of the hole being either parallel to the longitudinal axis of the security fastener ,at an angle to it or curved in a concave or convex form or any combination of parallel, angled or curved, and where these different diameters meet there maybe a chamfer or curved area.

12) A security fastener according to claim nine, wherein the single smooth bore hole is reduced in diameter three or more times throughout its depth. The walls of the hole being either parallel to the longitudinal axis of the security fastener ,at an angle to it or curved in a concave or convex form or any combination of parallel, angled or curved, and where these different diameters meet there maybe a chamfer or curved area.

13) A torque resistant security fastener having a head and shank, the shank having external locating pins or grooves on its length, for enabling the security fastener to be turned and locked into an object and be unlocked from the object, such as a bayonet type connection. The head having a surface which is completely smooth having no protrusions , and of such a shape that resists the transmission of torque by grip or leaverage, in which there is a single smooth bore hole, the hole having its centre lying along the longitudinal axis of the security fastener. The depth of the hole may pass through the head thickness and into the shank. At the surface of the hole a chamfer or concave or convex area may be formed.

14) A security fastener according to claim thirteen.wherein the single smooth bore hole is reduced in diameter once throughout its depth. The walls of the hole being either parallel to the longitudinal axis of the security fastener, at an angle to it or curved in a concave or convex form, and where these different diameters meet there maybe a chamfer or curved area.

15) A security fastener according to claim thirteen, wherein the single smooth bore hole is reduced in diameter twice throughout its depth. The walls of the hole being either parallel to the longitudinal axis of the security fastener,at an

angle to it, curved in a concave or convex form or any combination of parallel, angled or curved, and where these different diameters meet there maybe a chamfer or curved area.

16) A security fastener according to claim thirteen, wherein the single smooth bore hole is reduced in diameter three or more times throughout its depth. The walls of the hole being either parallel to the longitudinal axis of the security fastener ,at an angle to it, curved in a concave or convex form or any combination of parallel angled or curved, and where these different diameters meet there may be a chamfer or curved area.

17) A security fastener substantially as herein discribed with reference to figures 2,3,5,6,7,8,9 10 & 11.

18) A tool having a hexagon shaped shank with a tapered area at each end, the surface of the tapered area having spiral grooves on the surface. The spiral grooves at one end of the body being right hand form ,and those at the other, left hand form.

19) A tool that has a hexagon shank which has a tapered area situated at one end ,the tapered area having spiral grooves of either right hand or left hand form.

20) A tool with a hexagon shank which at one end has a tapered area preceded by a collar , the tapered area having on its surface spiral grooves of either right or left hand form.

21) A tool with a hexagon shank at one end of which is a collar followed by a tapered area with spiral grooves followed by a pilot , the pilot may be straight or tapered.

22) A tool with a hexagon shank, at one end of which is situated a collar or collars, tapered area or areas and pilot or pilots arranged in any combination or position, as long as one of the tapered areas has spiral grooves on its surface of either right or left hand form.

23) A tool according to claims 18,19,20,21 & 22 wherein the shank of the tool is of round triangular, oval, square or other shape.

24) A tool according to claims 18,19,20,21,22 & 23 wherein the shank has an area on its surface which

by its form is mateable with a seperate handle , turning device, or tool.

25) A tool according to claims 19,20,21,22 & 23 wherein the shank is fixed with a permanent handle ,turning device or tool.

26) A tool substantially as herein described with reference to figures 1,11,12,13,14 & 15.

27) In combination a security fastener or fasteners as claimed in any of the preceding claims, or as substantially herein described with reference to figures 2,3,4,5,6,7,8,9,10 & 11 and a tool as claimed in any of the preceding claims,or substantially herein described with reference to figures 1,11,12,13,14,& 15.

Amendm nts t the claims have been fil d as follows

1) A tamper resistant security fastener comprising of an assembly of three parts, a body and two uniquely sized interchangeable internal turning shafts, for ease of description hereafter the body of the security fastener" shall be referred to as "The Body" and the uniquely sized interchangeable internal turning shafts of the security fastener shall be referred to each as a "Shaft Tool".The Body of the security fastener having a Head and Shank, the shank having an external or internal thread on all or part of its length, of either right or left hand form for enabling the body to be screwed into or onto an object and be unscrewed from an object, the remainder of the shanks surface being smooth . The Heads surface is also completely smooth with no protrusions, and of such a shape that resists the transmission of torque by grip or leverage. Within the head are situated two cylindrical holes, the walls and bases of which are completely smooth, also the centre of each cylindrical hole lies along the longitudinal axis of the body. The combined depth of the cylindrical holes may pass through the head thickness and into the shank. The walls of the cylindrical holes always being parallel. At the outer lip of any of the cylindrical holes there may be a chamfer or curved area of concave or convex form. The depth and diameter of the cylindrical holes on different batches of bodies that have identical external shape size and thread forms, may vary to create unique cylindrical hole size combinations within the body . The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against, for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with sprial grooves on its surface , the spiral grooves being of either right hand or left hand form . Also there is an external cylindrical shaped area sized to locate precisely into the body so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.
Batches of shaft tools and bodies may be manufactured with their own unique cylindrical dimensions to ensure that a shaft tool of one

batch will not engage correctly into a body of another batch in such a manner that its tapered spiral area would come into correct contact with a cylindrical hole which would result in rotational torque, thereby creating unique batches of security fastener. For extra security the separate parts of the security fastener may be sold separately with a particular shaft tool or tools being restricted to a particular user or group.

2) A tamper resistant security fastener comprising of three parts according to claim one, wherein the body may have three cylindrical holes formed in it, and the shaft tools having two external cylindrical form on thier surface,the position of the tapered grooved area being situated either above in between or below the cylindrical formed areas, so long as the cylindrical formed areas are placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

3) A tamper resistant security fastener comprising of three parts according to claim one, wherein the body may have four or more cylindrical holes formed in it, and the shaft tools having three or more external cylindrical forms on there surface, the tapered and grooved area being situated above in between or below any of the cylindrical formed areas so long as the cylindrical formed areas are placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

4) A tamper resistant security fastener comprising of three parts according to claim one, wherein the body may have in addition to the two cylindrical holes, a smooth tapered hole or holes situated above the first cylindrical hole .below it , above the second cylindrical hole or below it or any combination of two cylindrical holes and a tapered hole or holes as long as all holes be they cylindrical or tapered have thier centres lying

along the longitudinal axis of the body. The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form . Also there is an external cylindrical shaped area and a smooth tapered area or areas which are all sized and placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

5) A tamper resistant security fastener comprising of three parts according to claim one. wherein the body may have three or more cylindrical holes, and a smooth tapered hole or holes situated above, below any or all of the cylindrical holes in any conbination of three or more cylindrical holes and a tapered hole or holes, as long as all holes be they cylindrical or tapered have thier centres lying along the longitudinal axis of the body. The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form together with external cylindrical shaped areas and a smooth tapered area or areas positioned in any order or combination so long as they are all sized and placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

6) A tamper resistant security fastener comprising of an assembly of three parts, a body and two uniquely sized interchangeable internal turning shafts. for ease of description hereafter the body of the security fastener" shall be referred to as "The Body" and the uniquely sized

interchangable internal turning shafts of the security fastener shall be referred to each as a "Shaft Tool".The Body of the security fastener having no Head only Shank, the shank having an external or internal thread on all or part of its length, of either right or left hand form for enabling the body to be screwed into or onto an object and be unscrewed from an object, the remainder of the shanks surface being smooth .
At one end of the shank are situated two cylindrical holes, the walls and bases of which are completely smooth, also the centre of each cylindrical hole lies along the longitudinal axis of the body. The walls of the cylindrical holes always being parallel. At the outer lip of any of the cylindrical holes there may be a chamfer or curved area of concave or convex form. The depth and diameter of the cylindrical holes on different batches of bodies that have identical external shape ,size and thread forms, may vary to create unique cylindrical hole size combinations within the body . The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form , also there is an external cylindrical shaped area ,sized to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.
Batches of shaft tools and bodies may be manufactured with thier own unique cylindrical dimensions, to ensure that a shaft tool of one batch will not engage correct into a body of another batch in such a manor that its tapered spiral area would come into correctly contact with a cylindrical hole which would result in rotational torque, thereby creating unique batches of security fastener, for extra security the separate parts of the security fastener may be sold separately, with a particular shaft tool or tools being restricted to a particular user or group.

7) A tamper resistant security fastener comprising of three parts according to claim six, wherein the

body may have three cylindrical holes formed in it. and the shaft tools having two external cylindrical form on thier surface,the position of the tapered grooved area being situated either above in between or below the cylindrical formed areas, the cylindrical formed area placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

8) A tamper resistant security fastener comprising of three parts according to claim six, wherein the body may have four or more cylindrical holes formed in it, and the shaft tools having a three or more external cylindrical forms on thier surface, the tapered and grooved area being situated above , in between or below any of the cylindrical formed areas so long as the cylindrical formed areas are placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

9) A tamper resistant security fastener comprising of three parts according to claim six, wherein the body may have in addition to the two cylindrical holes, a smooth tapered hole or holes situated above the first cylindrical hole ,below it , above the second cylindrical hole or below it or any combination of two cylindrical holes and a tapered hole or holes as long as all holes be they cylindrical or tapered have thier centres lying along the longitudinal axis of the body. The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form . Also there is an external cylindrical shaped area and a smooth tapered area or areas which are all sized and placed to locate precisely into the body, so as to position the shaft tool in such a manner as to

ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

10)A tamper resistant security fastener comprising of three parts according to claim six, wherein the body may have three or more cylindrical holes, and a smooth tapered hole or holes situated above, below any or all of the cylindrical holes in any conbination of three or more cylindrical holes and a tapered hole or holes, as long as all holes be they cylindrical or tapered have thier centres lying along the longitudinal axis of the body. The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form together with external cylindrical shaped areas and a smooth tapered area or areas positioned in any order or combination so long as they are all sized and placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

11)A tamper resistant security fastener comprising of an assembly of three parts, a body and two uniquely sized interchangeable internal turning shafts, for ease of description hereafter the body of the security fastener" shall be referred to as "The Body" and the uniquely sized interchangable internal turning shafts of the security fastener shall be referred to each as a "Shaft Tool".The Body of the security fastener having a Head and Shank, the shank having external pins on its length for enabling the body to be locked into an object and be unlocked from an object such as a bayonet type connection, the remainder of the shanks surface being smooth . The Heads surface is also completely smooth with no protrusions, and of such a shape that resists the transmission of torque by grip or leverage. Within the head are situated two cylindrical holes, the walls and bases of which are completely

smooth, also the centre of each cylindrical hole lies along the longitudinal axis of the body. The combined depth of the cylindrical holes may pass through the head thickness and into the shank. The walls of the cylindrical holes always being parallel. At the outer lip of any of the cylindrical holes there may be a chamfer or curved area of concave or convex form. The depth and diameter of the cylindrical holes on different batches of bodies that have identical external shape size and thread forms, may vary to create unique cylindrical hole size combinations within the body . The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form , also there is an external cylindrical shaped area sized to locate precisely into the body so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.
Batches of shaft tools and bodies may be manufactured with thier own unique cylindrical dimensions, to ensure that a shaft tool of one batch will not engage correct into a body of another batch in such a manner that its tapered spiral area would come into correct contact with a cylindrical hole which would result in rotational torque, thereby creating unique batches of security fastener, for extra security the separate parts of the security fastener may be sold separately, with a particular shaft tool or tools being restricted to a particular user or group.

12)A tamper resistant security fastener comprising of three parts according to claim eleven, wherein the body may have three cylindrical holes formed in it, and the shaft tools having two external cylindrical form on thier surface,the position of the tapered grooved area being situated either above ,in between or below the cylindrical formed areas, the cylindrical formed areas placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck

of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

13)A tamper resistant security fastener comprising of three parts according to claim eleven, wherein the body may have four or more cylindrical holes formed in it, and the shaft tools having three or more external cylindrical forms on thier surface, the tapered and grooved area being situated above , in between or below any of the cylindrical formed areas so long as the cylindrical formed areas are placed to locate precisely into the body, so as to position the shaft tool in such a maner as to ensure that the tapered grooved area on it surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

14)A tamper resistant security fastener comprising of three parts according to claim eleven, wherein the body may have in addition to the two cylindrical holes, a smooth tapered hole or holes situated above the first cylindrical hole ,below it , above the second cylindrical hole or below it or any combination of two cylindrical holes and a tapered hole or holes as long as all holes be they cylindrical or tapered have thier centres lying along the longitudinal axis of the body. The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form , also there is an external cylindrical shaped area and a smooth tapered area or areas which are all sized and placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

15)A tamper resistant security fastener comprising of three parts according to claim eleven, wherein the body may have three or more cylindrical holes,

and a smooth tapered hole or holes situated above, below any or all of the cylindrical holes in any conbination of three or more cylindrical holes and a tapered hole or holes, as long as all holes be they cylindrical or taper have thier centres lying along the longitudinal axis of the body. The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form together with external cylindrical shaped areas and a smooth tapered area or areas positioned in any order or combination so long as they are all sized and placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

16)A tamper resistant security fastener comprising of an assembly of three parts, a body and two uniquely sized interchangeable internal turning shafts, for ease of description hereafter the body of the security fastener" shall be referred to as "The Body" and the uniquely sized interchangable internal turning shafts of the security fastener shall be referred to each as a "Shaft Tool".The Body of the security fastener having no head or Shank, only a internal thread in part of its length, of either right or left hand form for enabling the body to be screwed into or onto an object and be unscrewed from an object. The bodies surface being completely smooth with no protrusions, and of such a shape that resists the transmission of torque by grip or leverage. Within the body are situated two cylindrical holes, the walls and bases of which are completely smooth, also the centre of each cylindrical hole lies along the longitudinal axis of the body. being parallel. At the outer lip of any of the cylindrical holes there may be a chamfer or curved area of concave or convex form. The depth and diameter of the cylindrical holes on different batches of bodies that have identical external shape ,size and thread forms, may vary to create unique cylindrical hole size combinations within the body . The shaft tools have a hexagon, round, or shaped area at one end by which they may be

gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form , also there is an external cylindrical shaped area ,sized to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.
Batches of shaft tools and bodies may be manufactured with thier own unique cylindrical dimensions, to ensure that a shaft tool of one batch will not engage correctly into a body of another batch in such a mannrr that its tapered spiral area would come into correct contact with a cylindrical hole which would result in rotational torque. thereby creating unique batches of security fastener. For extra security the seperate parts of the security fastener may be sold seperatly, with a particular shaft tool or tools being restricted to a particular user or group.

17)A tamper resistant security fastener comprising of three parts according to claim sixteen, wherein the body may have three cylindrical holes formed in it, and the shaft tools having two external cylindrical form on thier surface,the position of the tapered grooved area being situated either above ,in between or below the cylindrical formed areas, the cylindrical formed areas placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on it surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

18)A tamper resistant security fastener comprising of three parts according to claim sixteen, wherein the body may have four or more cylindrical holes formed in it, and the shaft tools having three or more external cylindrical forms on thier surface, the tapered and grooved area being situated above , in between or below any of the cylindrical formed areas so long as the cylindrical formed areas locate precisely into the body, so as to

position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

19)A tamper resistant security fastener comprising of three parts according to claim sixteen, wherein the body may have in addition to the two cylindrical holes, a smooth tapered hole or holes situated above the first cylindrical hole ,below it , above the second cylindrical hole or below it or any combination of two cylindrical holes and a tapered hole or holes as long as all holes be they cylindrical or tapered have thier centres lying along the longitudinal axis of the body. The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either right hand or left hand form , also there is an external cylindrical shaped area and a smooth tapered area or areas which are all sized and placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

20)A tamper resistant security fastener comprising of three parts according to claim sixteen, wherein the body may have three or more cylindrical holes, and a smooth tapered hole or holes situated above, below any or all of the cylindrical holes in any conbination of three or more cylindrical holes and a tapered hole or holes, as long as all holes be they cylindrical or taper have thier centres lying along the longitudinal axis of the body. The shaft tools have a hexagon, round, or shaped area at one end by which they may be gripped , locked onto or located against for the purpose of rotating them with a Tool into the body of the security fastener. At the other end there is situated a tapered area with spiral grooves on its surface , the spiral grooves being of either

right hand or left hand form together with external cylindrical shaped areas and a smooth tapered area or areas positioned in any order or combination so long as they are all sized and placed to locate precisely into the body, so as to position the shaft tool in such a manner as to ensure that the tapered grooved area on its surface comes into correct contact with the neck of a cylindrical hole in the body, so that when the shaft tool is rotated inwards it locks onto a neck of a cylindrical hole within the body resulting in the required rotational force.

21) A tamper resistant security fastener comprising of an assembly of three parts substantially as herein discribed with reference to figures 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16.

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Examiner's report to the Comptroller under Section 17 (The Search Report)

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R levant Technical fields

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Search Examiner

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Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Date of Search

13 JUNE 1992

Documents considered relevant following a search in respect of claims 1-12

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 0700854 A (ETAB. NEYRPIC) Figure 3	1
X	GB 0637683 A (WILLIAMS) Figures 1-3	1, 2
X	GB 0513497 A (COLEMAN) Figures 1-7	1, 2, 3, 4
X	GB 0511033 A (BRADSHAW) All figures	1, 2

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Category	Identity of document and relevant passages	Relevant to claim(s.

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

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